



Life Illustrated

California Academy of Sciences 2012 Annual Report



Picture this: A beetle tunnels across a vibrant green roof, aerating the soil and helping the native California plants to thrive. Beneath these hills, colorful fish are schooling, endangered frogs are breeding, penguins are diving, and more than 28 million specimens from around the world are helping scientists answer some of the biggest questions of our time. There has never been a better place to illustrate the story of life on Earth — not just the story of how we got here, but also of how we will find a way to stay.





» LETTER FROM THE EXECUTIVE DIRECTOR & CHAIRMAN OF THE BOARD

Since the time of our cave-dwelling prehistoric ancestors, humans have been drawn to illustrate life, transforming our curiosity about the natural world into knowledge. Today, however, our efforts to document the world around us are driven by more than curiosity. A rapidly changing climate and the other impacts of human activity threaten our collective survival, and our ability to chart a sustainable future will require a deeper understanding of the interconnected web of life.

Here at the California Academy of Sciences, we've been illustrating the story of life on our planet—unearthing new characters, revealing relationships, and sharing our findings in innovative ways—for more than 160 years. As you will see throughout this report on our activities in 2012, the Academy's tradition of illustrating life continues to evolve. Digital photography, 3D computer-based design, data-driven visualization techniques, advances that enable us to maintain complex habitats for living specimens, technology that facilitates human interconnections across time and geography—these are just some of the tools that are bringing the Academy's mission to life as never before.

One of the most important ingredients in that transformation is generosity—yours. The challenges we face as residents of our Solar System's only known habitable planet are dauntingly complex, and addressing them will require science literacy across our society—from scientists and policy-makers to parents, educators, and business people, global citizens all. When you support the Academy, you nurture a rare institution of science learning that, unlike the gated havens we call universities, is open to everyone.

One of the most important questions we face, each and every one of us, in the stillness of the night, is this: What kind of world will we leave our children and grandchildren? Know that you are shaping the answer. Your generosity enables the Academy, a dedicated illustrator of life, to draw more than pictures that capture disappearing biodiversity. You are helping people of all ages draw connections, grounded in science, that will help us sustain this precious planet.



GREGORY C. FARRINGTON

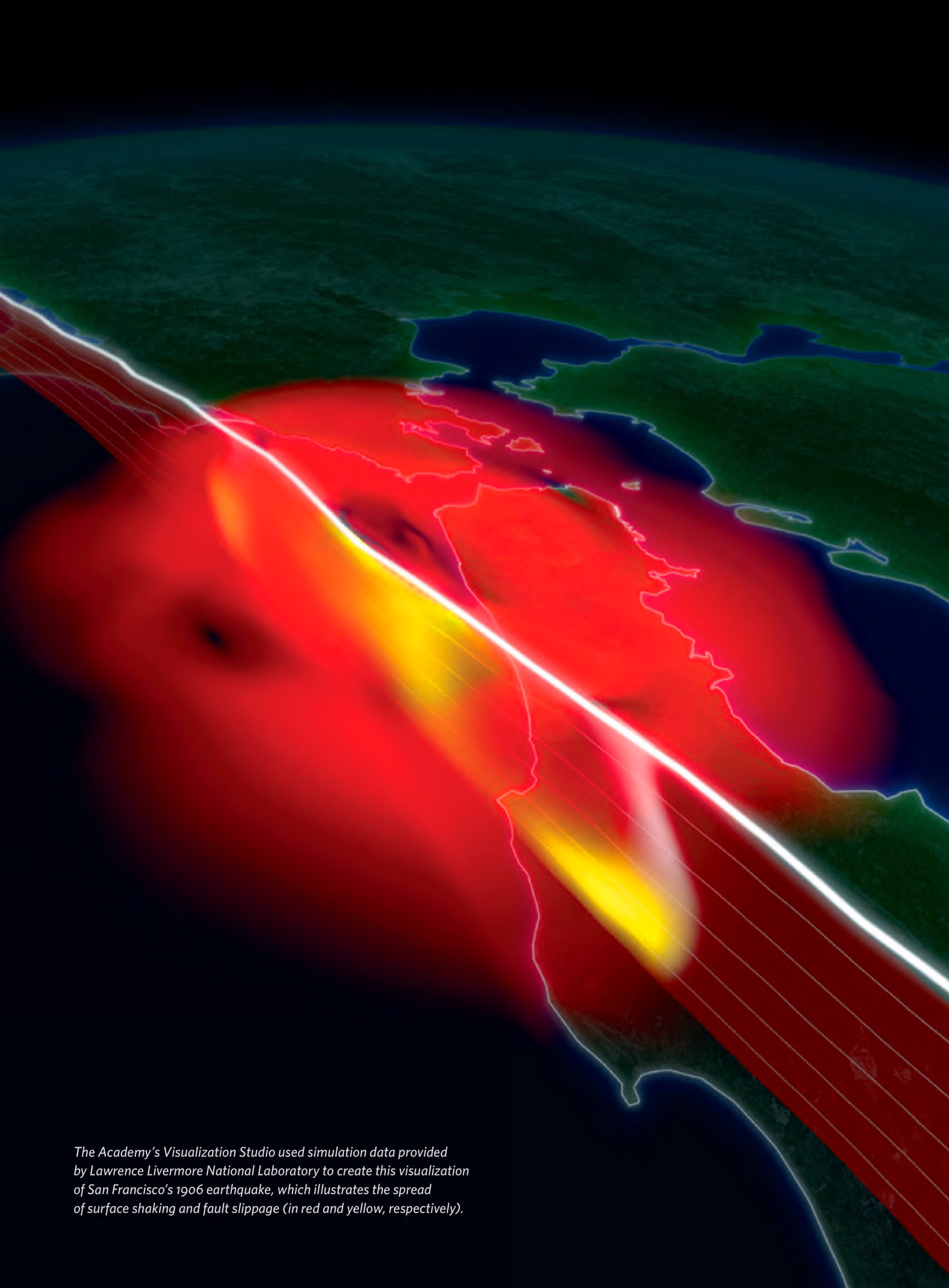
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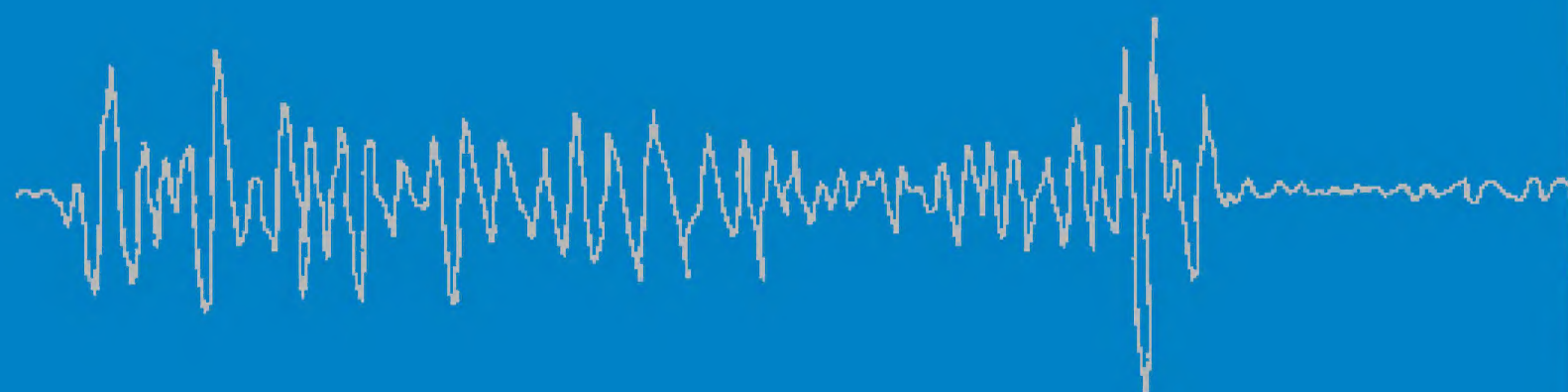
California Academy of Sciences



The Academy's Visualization Studio used simulation data provided by Lawrence Livermore National Laboratory to create this visualization of San Francisco's 1906 earthquake, which illustrates the spread of surface shaking and fault slippage (in red and yellow, respectively).

Visualizing Science

At the California Academy of Sciences, seeing is more than believing. In fact, seeing is just one aspect of an immersion in science that opens minds, prompts questions, inspires the imagination, and cultivates a personal sense of responsibility for the planet. Through exhibits and experiences unlike any others on Earth, the Academy illustrates the diversity and mystery that surround us — changing the way millions of visitors each year see science, the natural world, and their connection to both.





Connecting Visitors with Science Superheroes

» ACTIVE ZONE FOR SCIENCE INITIATIVE

What's faster than a speeding comet? More powerful than an earthquake simulator? Able to illustrate key biodiversity concepts with a single specimen? An Academy scientist—one of the most potent forces for science literacy on the planet. You'll find these superheroes chasing ants up the cliffs of

Madagascar, diving in coral reefs off the Philippines, tracking strange life forms in Cameroon, Hawaii, or Brazil—and sharing their adventures and discoveries in the Academy's Active Zone for Science.

Few institutions are powered by such Indiana Jones-style



Shaking Our Perceptions

» EARTHQUAKE EXHIBIT AND PLANETARIUM SHOW

Seismic activity is a fact of life in the Bay Area, and starting in May 2012, thanks to Academy supporters like Ann L. and Charles B. Johnson, Academy visitors from around the world had the chance to find out what all the shaking is about.

Honoring the contributions to seismology and public safety of former Academy President and Fellow Bruce Bolt, the Johnsons underwrote *Earthquake: Evidence of a Restless Planet*, a breathtaking planetarium tour of the Earth's seismic past, from the break-up of Pangaea 200 million years ago, to continent-shaping

quakes in Africa and Asia, to the 2011 9.0-magnitude quake and tsunami in Tohoku, Japan. In the Academy's tradition of innovative life illustration, the show harnessed the latest techniques in data-driven visualization to help visitors understand the complex processes of the Earth.

Journeys under the planetarium dome were just one way Academy visitors investigated seismic phenomena in 2012. A walk-through model of the Earth, an interactive space teaching earthquake preparedness, ancient fossils, baby ostriches (living examples

of how plate tectonics affect life)—all were part of *Earthquake: Life on a Dynamic Planet*, a kinetic exhibit made possible by Lakeside Foundation, with additional support from California Earthquake Authority, The Bernard Osher Foundation, PG&E, and Safeway. And let's not forget the earthquake simulator. This new take on an old favorite was built on a foundation laid by 315 donors who mounted a campaign to "bring back the shake table," allowing visitors to experience a little of the 1906 and 1989 quakes that shaped San Francisco history.





explorers, who are supported by equally dedicated collections managers, archivists, students, and educators. In the Active Zone, their world-class research is accessible to the public—and it's personal. Chat with a herpetologist about frogs found on the ancient, isolated African island of São Tomé. Converse with a biologist who has studied, tracked, trapped, relocated,

and contributed to the recovery of wolves in the American west. Swap ideas with a renowned scientist who can tell you why sharks are more valuable alive than dead. It's all part of the Academy's mission to make science real and relevant—a reason to act with the future of our shared planet in mind.

Widening Our Window Onto the Universe

» MORRISON PLANETARIUM'S 60TH ANNIVERSARY

To honor her late husband, May Treat Morrison included the Academy as a beneficiary of her estate, seeking to open a window onto the Universe for Academy visitors. Little did she know that more than 50 years later, her modest gift would attract additional donors—including Wendy and Eric Schmidt—to build a planetarium that would set the standard for state-of-the-art equipment and innovative programming for decades to come.

In the 21st century, Morrison Planetarium continues to provide a visionary perspective on the nature of life on Earth and the origins of the Universe. The largest all-digital planetarium in the world, Morrison leads the industry as an award-winning producer of full-dome digital programs shown worldwide. In 2012, the Academy celebrated the 60th anniversary of its glorious planetarium with a week of lectures and special events. During this anniversary year, more than 383,000 people watched a Morrison

Planetarium-produced show at the Academy—40,000 of them in Hohfeld Hall, the entry portal to the planetarium, and another 35,000 in a portable planetarium dome. The shows also thrilled audiences in Finland, France, and more than a dozen other international markets.



The Morrison was the first U.S. institution to build a star projector.



“Morrison Planetarium has a long history of innovation, and we are proud to continue that tradition as we redefine the ways science visualization integrates into planetarium programming.”

— Ryan Wyatt
Director of Planetarium
and Science Visualization

Revealing Our World

Here's a question: How can we best preserve the Tree of Life when we haven't finished sketching its branches? Every day, around the globe, Academy scientists are adding to our understanding of life by unearthing (sometimes literally) new species, pushing the boundaries of scientific knowledge, and shaping conservation action with their discoveries. But not all life-illustrators are scientists with advanced degrees. In 2012, generous support for new Academy initiatives empowered ordinary citizens to partner in revealing our world.



Academy scientists used a scanning electron microscope to capture these images of sclerites—spiny skeletal elements of soft corals that are less than a tenth of a millimeter in length. The images helped to identify a new species of soft coral known only in the coastal region of San Diego, California.





Protecting Treasures in Our Midst

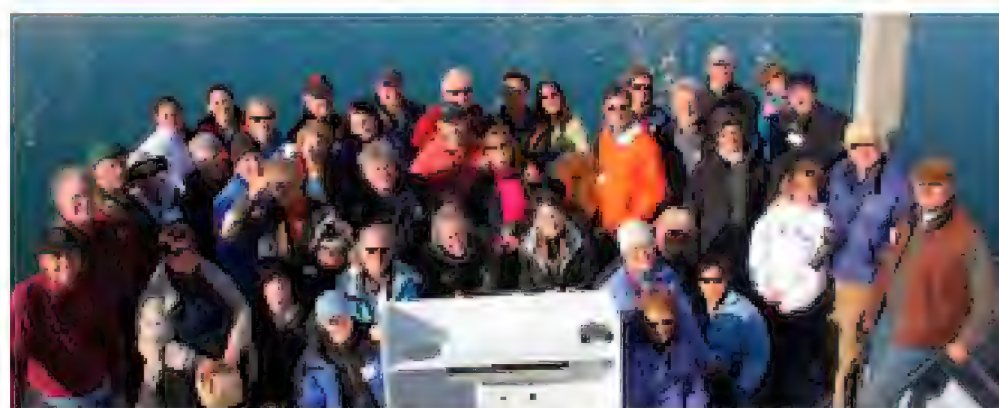
» GUIDING CONSERVATION DECISIONS

Just 30 miles beyond the Golden Gate, the rocky Farallon Islands and their surrounding waters support astounding biodiversity: the country's largest assemblage of breeding sea birds; porpoises and dolphins; migrating great white sharks, orcas, and blue, grey, and humpback whales; thousands of seals and sea lions.

Since 2001, scientists and lawmakers have been working to expand the boundaries of the Gulf of the Farallones National Marine Sanctuary to protect more species and aquatic resources. Now, thanks to generous support

for Academy research, new knowledge is moving that effort forward.

In October 2012, Academy scientist Gary Williams joined a two-week expedition led by the National Oceanic and Atmospheric Administration (NOAA) to assess biodiversity in and around the Gulf of the Farallones National Marine Sanctuary. Based on this trip and past field work, Williams issued recommendations to support NOAA's expansion proposal. His research will inform the development of new guidelines to protect the sanctuary's source waters, nationally significant



The Academy's Platinum Circle donors enjoy a local expedition to the Farallones.

seascapes, and wildlife—and promote ecotourism and sustainable fishing practices. But Williams brought back more than a conservation recommendation: He also

discovered a new genus of sea fan, illustrating that there is still more to discover, document, and protect, right in the Academy's own neighborhood.

"As passengers on earth, we cannot protect our endangered environment without learning how we harm it and how best to preserve it, both of which are missions of the California Academy of Sciences."

— **Troy and Leslie Daniels**
Academy Trustee and Platinum Circle donors



Expanding Earth's Family Tree

» GLOBAL EXPLORATION AND DISCOVERY

In 2012, Academy scientists at work in biodiversity hotspots around the globe added 189 new species to Earth's family tree, expanding our understanding of the web of life and enhancing our ability to make informed conservation decisions. Proving that there are still plenty of places to explore on our planet, the scientists made their finds over four continents and two oceans, discovering new species on the tops of mountains, in the deep sea, and just about everywhere in between.

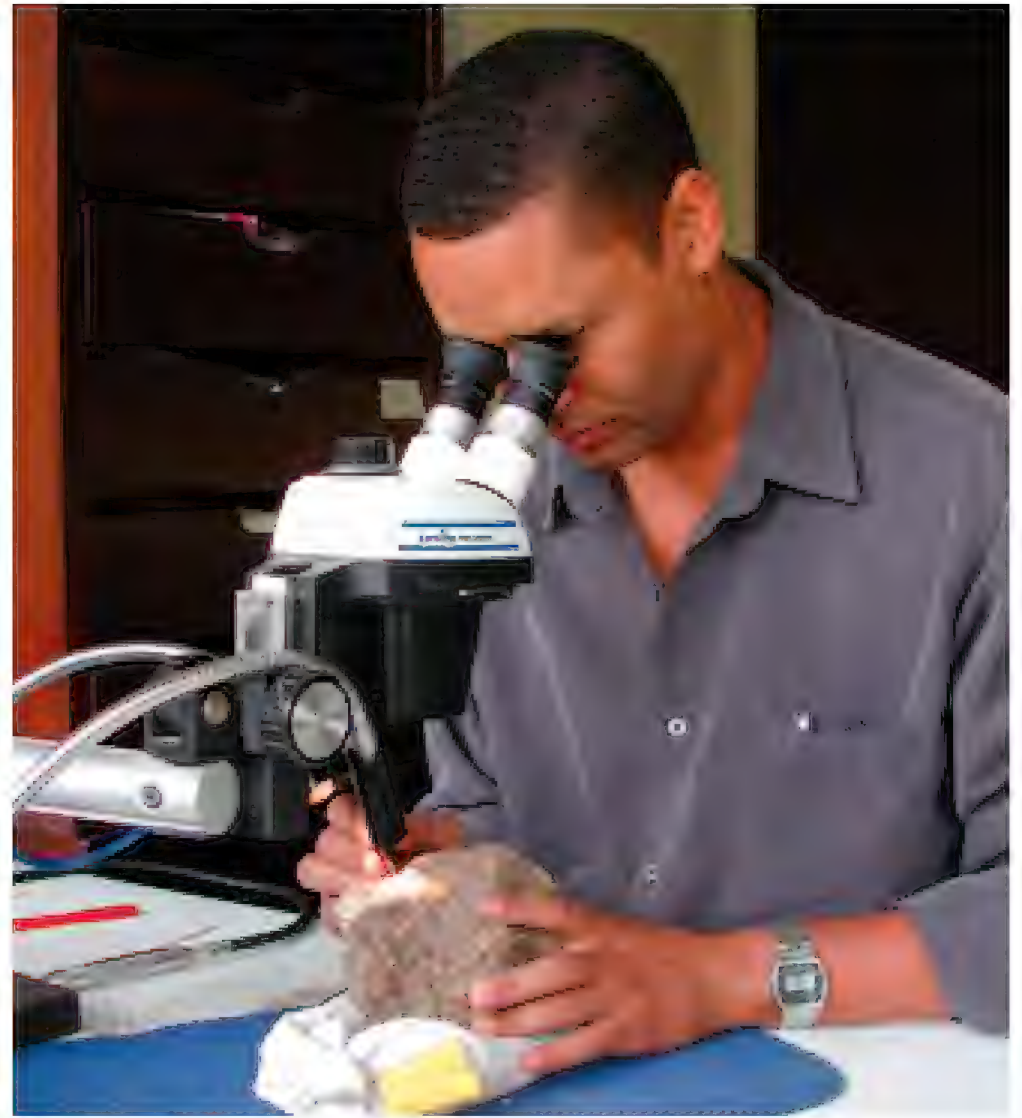
Consider *Trogloraptor*, or "cave robber"—a unique spider, with claws, found in a southern Oregon cave by a team that included Academy scientists supported by the Harriet Exline Frizzel Memorial Fund and a student in the Academy's Summer Systematics Institute, funded by the National Science Foundation. The rare find begs



Through both his fieldwork in Ethiopia and his analysis in the lab, Academy scientist Zeray Alemseged is helping to fill in critical details in the story of human evolution.

a question the Academy is eager to answer: What else is lurking in the forests and caves of western North America?

Other Academy discoveries are filling gaps in our understanding of human evolution. For 11 years,



Dr. Zeresenay Alemseged has been studying the fossil of an *Australopithecus afarensis* child—the same species as the famous "Lucy" skeleton—known as "Selam." Alemseged's delicate examination revealed that 3.3 million years ago,

Selam and Lucy lived a partially arboreal life, akin to apes, yet had humanlike lower limbs adapted for upright walking. The finding confirms that *A. afarensis* holds a pivotal place in our history—not fully human, but clearly on the way.



Mobilizing and Empowering Everyday Earth Advocates

» CITIZEN SCIENCE

Thanks to the S. D. Bechtel Jr. Foundation, the Academy is sustaining the "citizen" in "citizen science" through three pilot projects that empower people from all walks of life to connect with nature and document their discoveries, often starting right in their own backyards.

The effort builds on past research by Academy scientists that indicates that, in California, climate change is upon us and unfolding faster than we can track. To keep up, the Academy is mobilizing ordinary citizens and students to partner in a new survey of California's biodiversity. Participants working in habitats both terrestrial and marine, from Mt. Tamalpais

to San Francisco to Pillar Point, are collecting data that reveal shifts in the diversity and distribution of key species.

The initiative has received national attention as an example of how science learning can lead to Earth advocacy, and it has led the Academy to document and share its insights with other organizations seeking to advance scientific literacy and research. In May 2012, the Academy promoted its innovative new model by hosting participants from across the country at a conference exploring best practices for engaging the public in scientific research.



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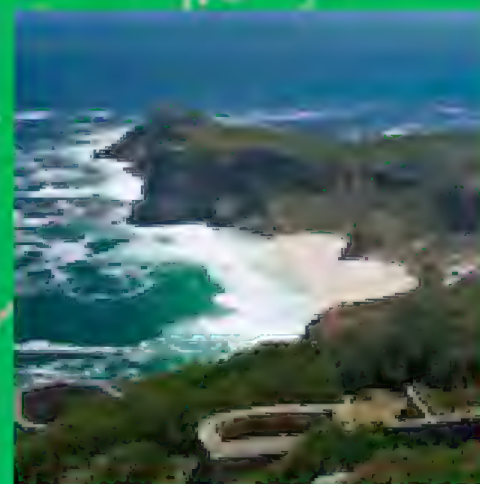
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Drawing Connections

Where can we find bright young minds that will grow into tomorrow's leading lights of science? And how will we cultivate science-savvy decision-makers who can ensure the health of the planet? For answers, look to the Academy. Friends who share our mission support innovative initiatives that are helping today's youth evolve into tomorrow's scientists and science-literate citizens and leaders—able to draw connections between their own actions and Earth's future.



This scientific illustration of Actinoptilum molle—a shallow water sea pen with both red and yellow color variations—was created by Stephanie King, who was an intern in the Academy's Summer Systematics Institute. The species is commonly seen by divers in South Africa and southern Mozambique.

Cultivating Science Literacy

» YOUTH PROGRAMS

Thanks in large part to visionary support from the Gordon and Betty Moore Foundation, Academy outreach to young people grew dramatically in 2012 through new and expanded programs that build science, communication, and leadership skills among middle and high school students by transforming out-of-school-time into learning opportunities. One pilot program—Teen Advocates for Science Communication, aka TASC Force—connects kids with Academy professionals to create innovative public programs. Flash mobs, collections-based fashion shows, pop-up exhibits—these are just a few of the ways TASC Force members bring out the fun in science and help others embrace their role in addressing Earth challenges like climate change. Also new in 2012, the Pearson Young Scientists program teams high school students with Academy partners on civic engagement projects—for

example, creating educational games on earthquake safety, or developing a community program to deal with problem plastics. A Summer Science Filmmaking Course enabled young people to build both their science-savvy and their digital skills, as they learned to write, film, and produce short films about science and sustainability. And we grew our Science Action Club program, with its science-themed after-school activities, to reach eight San Francisco middle schools.

No discussion of Academy youth programs would be complete without Careers in Science, a year-round internship initiative that blends science learning with research and opportunities to teach science to others. For 10th and 11th graders from communities under-represented in the sciences, it's a life-shaping experience—opening doors to opportunity, and nurturing diversity among tomorrow's science leaders.



The Academy's youth programs give middle and high school students a chance to engage in hands-on science and develop core 21st century skills, including teamwork and digital media fluency.



An intern peers into the microscope during a marine animal dissection.

"Through our youth programs, we equip teens with the 21st century skills they need to engage in their communities and care for our planet, while kindling in them a lifelong curiosity about science and the natural world."

— Elizabeth Babcock
Chief Public Engagement Officer
and Roberts Dean of Education



Teacher Training and Resources

With the support of donors like JPMorgan Chase, the Academy is helping science teachers become empowered science advocates and role models for their students. Teacher resources include real science training, professional development, creative Classroom Kits, and the chance to connect with peers in an environment that inspires

curiosity: the Academy.

Focused on critical 21st-century challenges, the Teacher Institute on Science and Sustainability is a two-year professional development program for 3rd through 5th grade science teachers that will be particularly helpful in bringing educators up to speed as California moves toward Next Generation



Seeding the Next Generation of Scientists

» SUMMER SYSTEMASTICS INSTITUTE

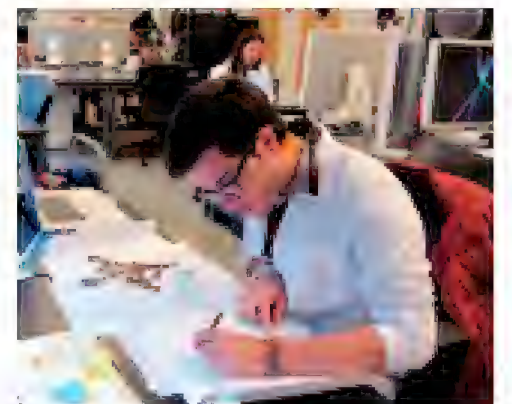
For 17 years, the Academy's Summer Systematics Institute (SSI) has provided aspiring natural science researchers — college undergraduates from across the country — with hands-on training and the inspiration to excel.

The intensive, two-month, collections-based program of lectures, labs, and field work wouldn't be possible without the generosity of Robert T. Wallace, who made a gift to endow undergraduate research

at the Academy, and the longtime support of the National Science Foundation. Each intern—including one interested in becoming a biological illustrator—is carefully matched with an Academy scientist-mentor, and at the program's conclusion gives a professional-caliber research presentation to a diverse audience of scientists and peers. Many of these talented undergrads go on to publish their findings in

peer-reviewed scientific journals or present them at international gatherings.

SSI is highly selective; of the hundreds of applicants, only 11 are chosen. And this year, for the first time, all 11 were women—a coincidence that will enhance the diversity of tomorrow's science corps and bring much-needed new voices and perspectives to future conversations about discovery and sustainability.



In partnership with their Academy mentors, 2012 interns identified new species, generated DNA data, and suggested conservation priorities.

Science Standards in its classrooms. The Academy also offers additional workshops in which teachers dive deep into science content, explore scientific practices, engage in effective teaching pedagogy, and learn how science really works.

In 2012, the Academy expanded its teacher toolkit by partnering with Northern

California's largest public broadcasting station, KQED, to develop a multi-touch eBook about earthquakes. The new tool—the first collaboration of its kind between a science institution and a public broadcasting station—blended the dynamic science and media resources of both institutions to create original content, using Apple's iBooks

Author and an iTunes U platform. The program, which complements the Academy's *Earthquake* exhibit and planetarium show, is free to download from iTunes, and became the #1 title in iTunes U. It also earned the American Alliance of Museums' coveted Media and Technology Muse Award.





Twice a day, a diver outfitted with an underwater microphone plunges into the Philippine Coral Reef—the deepest living coral exhibit in the world—to answer visitors' questions about everything from Nemo to the dangers of ocean acidification.





Donors

Generous philanthropists and partners enable the Academy to illustrate life in all its beauty, complexity, and urgency. For this great gift, the Academy extends its deepest gratitude.



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Steinhart Aquarium

Institute of Museum and Library Services

National Leadership Grant

National Oceanic and Atmospheric Administration

Curation of Biological Specimens & Historical Photographs Collected at Cordell Bank

Enhancing Response and Data Collection from Dead Stranded Marine Mammals in Northern California

Identify Invertebrate Colonization of Pmel Moorings in Alaskan Waters

Identification and Curation of Alaskan Invertebrates

Rocky Reef Interpretation and Restoration Program

The Worldview Network: Ecological Literacy Programming for Digital Planetariums & Beyond

National Science Foundation

ARRA - Collaborative Research: Ants of the SouthWest Indian Ocean

Catalog of Fishes: 2.1 Prep Comm. Participation

Collaborative Research: Biotic Surveys of Central Saharan Oases

Collaborative Research: Cal Bug, An Interactive Database Using Arthropods to Examine

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CSBR: Natural History Collections: Liquid Nitrogen Facilities for Biological Specimen Curation

Global Names Architecture Harnessing the Power of Herbaria to Understand the Changing Flora of CA

PBI: Collaborative Research: The Megadiverse, Microdistributed Spider Family Oonopidae

Phylogeography in Madagascar REU Summer Systematics

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REVSYS Collaborative Research: Relationships, Character Evolution, and Biogeographic Patterns in the Phylogenetically Pivotal Lineage

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Careers in Science



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In 2012, more than 1,000 animals were born through the Academy's captive breeding programs, including 10 violaceous euphonia chicks—colorful rainforest birds.

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Academy scientists who participated in the recent Hearst Expedition to the Philippines are now bona-fide TV stars. ABC-7's documentary about the expedition won a 2012 Emmy award.



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*The Grainy Cochran Frog, *Cochranella granulosa*, is one of more than 7,000 amphibians included in AmphibiaWeb, an online catalog launched by Academy Fellow David Wake in 2000 to track the distribution and conservation status of the world's known amphibians — a critical step in the efforts to protect these charismatic creatures.*



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David B. Wake

Professor Emeritus,
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Dr. David B. Wake is an internationally acclaimed scientist who studies the evolutionary biology of amphibians and the amphibian extinction crisis. He is a Fellow of the California Academy of Sciences as well as of the American Academy of Arts and Science and the American Philosophical Society, and is also a member of the National Academy of Sciences. He served as Director of Berkeley's Museum of Vertebrate Zoology for 27 years and remains

an active curator. Dr. Wake has led a prolific career, winning several prestigious awards, and his career remains productive with more than 110 papers published since his retirement in 2003. His many awards and honors include the Joseph Grinnell Medal in Scientific Natural History and the Henry S. Fitch Award for Excellence in Herpetology.



Financials

The Academy is committed to careful stewardship of the financial resources that sustain our research, support our growth, and enable us to engage others with the natural world.

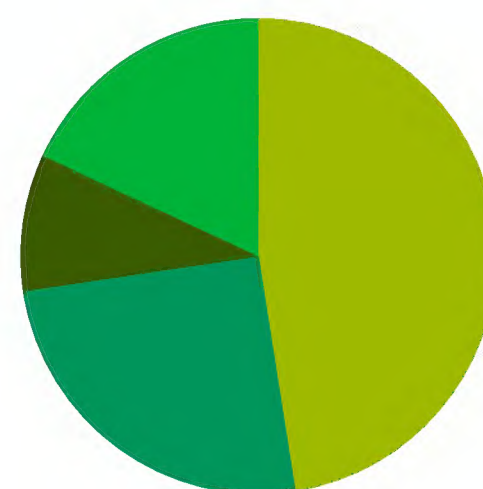
OPERATING REVENUE AND EXPENSES

Revenue	2012	2011
Earned Income	\$30,538,582	\$32,229,832
Contributions	\$16,149,816	\$14,537,654
Government Grants	\$5,993,396	\$5,677,727
Endowment Transfer	\$11,590,133	\$6,485,994
Total Revenue	\$64,271,927	\$58,931,207

Expenses	2012	2011
Research	\$13,500,444	\$12,212,698
Education & Outreach	\$4,564,811	\$1,927,486
Public Engagement	\$21,483,070	\$21,044,506
Aquarium	\$14,603,005	\$13,749,040
Development & Membership	\$5,417,835	\$4,986,620
Management & General	\$4,627,857	\$4,719,922
Total Expenses	\$64,197,022	\$58,640,272

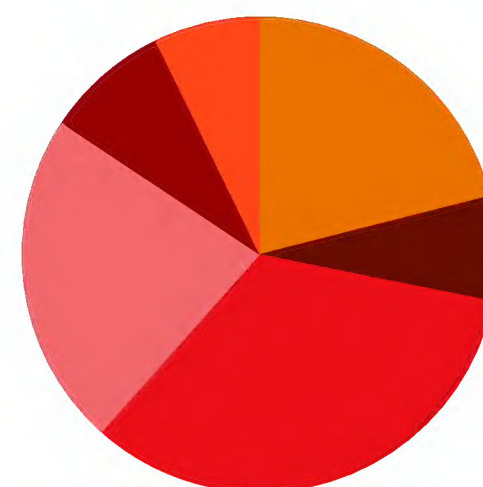
Financial Position

Assets	2012	2011
Investments	\$407,903,398	\$421,182,837
Receivables	\$15,268,640	\$21,792,569
Other	\$3,924,646	\$4,057,650
Property and Equipment	\$403,590,796	\$415,633,250
Total Assets	\$830,687,480	\$862,666,306
Liabilities		
Accounts Payable	\$5,975,456	\$6,051,201
Deferred Income	\$3,954,219	\$3,613,534
Bonds Payable	\$281,450,000	\$281,450,000
Other Long-term Liabilities	\$329,583	\$355,327
Total Liabilities	\$291,709,258	\$291,470,062
Unrestricted Net Assets	\$436,742,654	\$454,210,470
Temporarily Restricted	\$46,479,408	\$61,268,932
Permanently Restricted	\$55,756,160	\$55,716,842
Total Net Assets	\$538,978,222	\$571,196,244
Total Liabilities & Net Assets	\$830,687,480	\$862,666,306



Revenue

- 48% Earned Income
- 25% Contributions
- 9% Government Grants
- 18% Endowment Transfer



Expenses

- 21% Research
- 7% Education & Outreach
- 34% Public Engagement
- 23% Aquarium
- 8% Development & Membership
- 7% Management & General

Represents financials from July 1, 2011–June 30, 2012.

See the Academy website for the Academy's full audit report or contact the Development Department.



This photograph of a male great egret (Ardea alba) in breeding plumage—a winning submission in the Academy's LoveLife photo competition—was captured by Becky Jaffe during a display flight in Alameda, California.

Leadership

Champions of discovery and science education,
Academy leaders bring vision, inspiration, and direction
to our mission to explore, explain, and sustain life.

BOARD OF TRUSTEES, 2012–2013

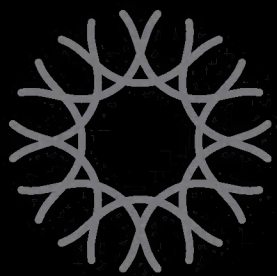
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SENIOR STAFF

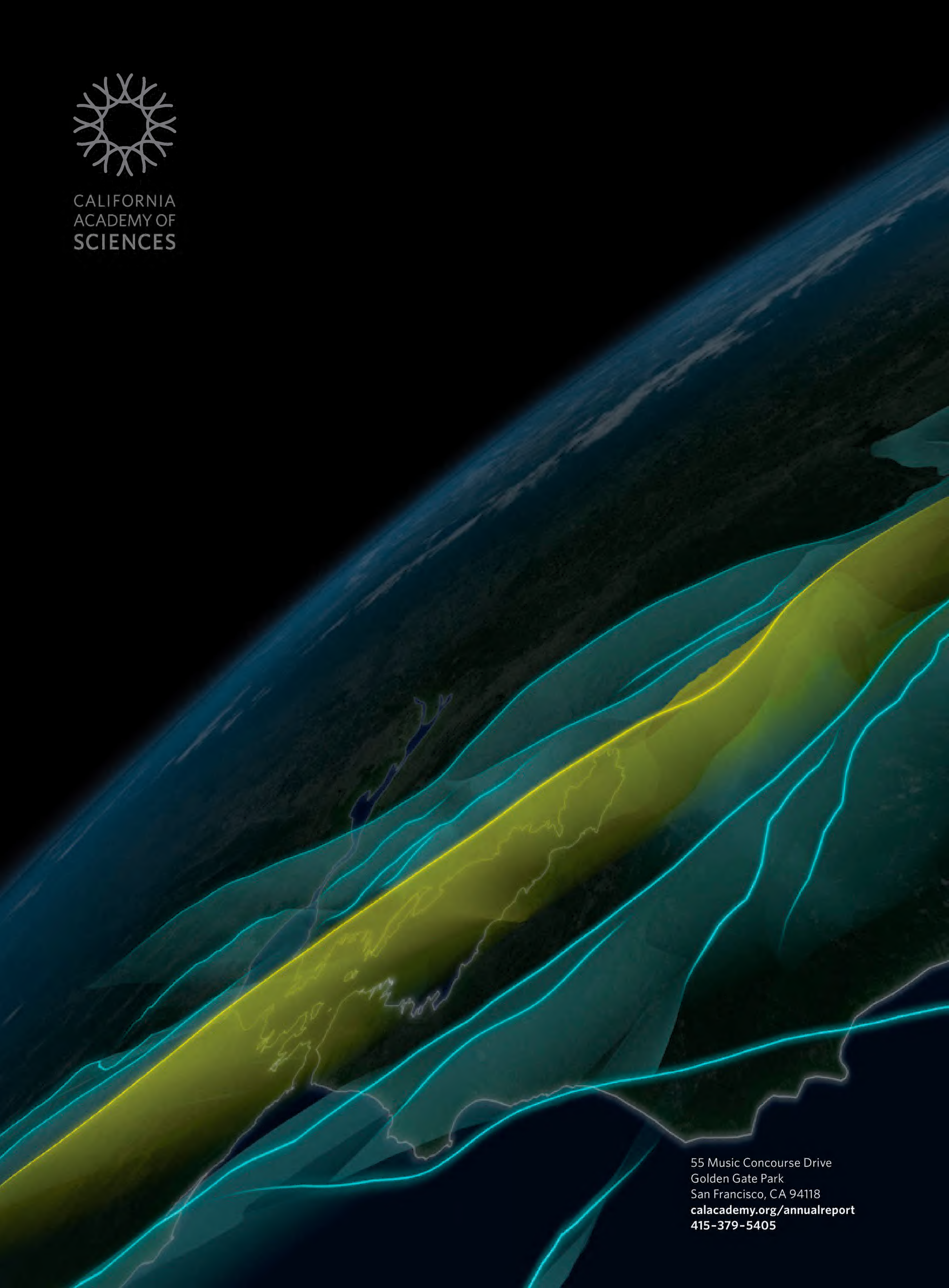
Gregory C. Farrington, Ph.D. <i>Executive Director, William R. and Gretchen B. Kimball Chair</i>	Alison Brown <i>Chief Financial Officer and Chief of Staff</i>	Terrence M. Gosliner, Ph.D. <i>Dean of Science and Research Collections, Harry W. and Diana V. Hind Chair</i>
Elizabeth C. Babcock, Ph.D. <i>Chief Public Engagement Officer and Roberts Dean of Education</i>	Melissa Felder <i>Chief Marketing Officer</i>	Janet M. Harris <i>Chief Development Officer</i>

Production Notes

Creative Director Rhonda Rubinstein	Photography Zeray Alemseged Sydney Buffman Daniel Furon Tim Griffith Kathi Koontz Daniel Leong Andrew McCormick Chris Picon Pearl Lucia Sayer Harry Tong Winnie Wintermeyer	Front Cover illustration of a longhorn beetle (<i>Sternotomis callais</i>) by Rachel Diaz-Bastin, Curatorial Assistant II, Entomology.	Special Thanks to our scientists Tom Daniel, Rich Mooi and Gary Williams, as well as the California Academy of Sciences Library for helping bring <i>Life Illustrated</i> to life.
Graphic Designer Sydney Buffman		Back cover by Visualization Studio: The complex fault system of the San Francisco Bay Area includes the Hayward fault, shown in yellow. Data courtesy of the U.S. Geological Survey.	Printed in San Francisco by Watermark Press on New Leaf Paper, Reincarnation. Manufactured in the USA.
Writer Betsy Brown			
Additional Writing Stephanie Stone			
Project Management Allison Oseth Alex Salz			



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